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Does A Woman's Education Affect Her Husband's Earnings?

Results for Israel in A Dual Labor Market

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and
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Household survey data indicate that in Israel a woman's education increases her husband's earnings at higher occupational levels but not at lower ones.

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This paper — a product of the Education and Employment Division, Population and Human Resources Department — is part of a larger effort in PRE to assess the impact of women's education on productivity and family welfare. Copies are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Valerie Charles, room S6-228, extension 33651 (17 pages with tables).

A recent focus on decisionmaking within the household (rather than by the individual) has opened a new field of research into the economics of marriage and the family.

Recent research indicates that in the United States, at least, a wife's education has a positive effect on a husband's earning capacity — a focused instance of the economic benefits of (particularly nonmarket) association. Even if education did not get women jobs or improve their ability to function as housewives and mothers, it is not wasted.

Such cross-productive effects may be different in the type of dual labor market that exists in Israel.

Drawing on data from the Israel Labor Mobility Survey, Neuman and Ziderman found that the wife's educational level increased a husband's earnings in Israel's primary sector (in which workers have good jobs, with good pay, security, and fringe benefits) — but not in the secondary sector (in which workers have low-paying, unstable, generally unattractive jobs).

These new findings are consistent with the general implications of the dual labor market model.

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Introduction:

In the quarter century following Becker's now classic presentation of the human capital model in terms of formal schooling and training on-the-job, the approach has been extended with telling effect into numerous additional fields of application - a tribute to the fecundity of the original formulation. One development of some particular interest has been the focus on decision making within the household unit rather than on that of the individual, an approach that has opened up a new field of research into the economics of marriage and the family.[1/] Indeed, adopting the wider focus of the household rather than the individual decision maker, Benham has shown that for the U.S. at least, wife's education has a positive effect on husband's earnings capacity.[2/] Putting on one side for the moment alternative explanations in terms of mate sorting,[3/] Benham's finding suggests that a person's own labor market productivity (P_o) is affected not only by his own human capital attainments (H_o) but also by those of this spouse (H_s). Formally,

$$P_o = F\ (H_o,\ H_s)$$

$$\text{where } \delta P_o/\delta H_s > 0.$$

Thus the effective human capital stock of a married person is a positive function of the human capital of each marriage partner. Benham sees these positive cross-productivity effects of education within marriage, as a

particularly focussed form of the transfer of the benefits of education by (particularly, non-market) association.[4/] He argues that these benefits may arise in at least three ways:

(1) by providing a close substitute for a person's own formal education by extending information and advice,

(2) by helping the person acquire specific skills, and

(3) by helping the person acquire general skills related to information acquisition and assimilation and coping with change.[5/]

Marriage of course offers both greater opportunities for sharing in the pecuniary benefits of association and, therefore, a larger incentive for doing so, than are available in other forms of non-market association.[6/]

But are there particular labor market contexts in which we might fail to observe such positive cross-productivity effects of wife's education on husband's earnings? That this may be the case is suggested by the results of a recent application of this approach to small family businessses. Using data for Hong Kong, Wong argues that cross-productivity effects are stronger within entrepreneural families (when both spouses work in the family business) than for wage-employed families. Would cross productivity effects also differ across broad occupational categories? The purpose of this paper is to probe some of these issues using israeli data.

In an earlier paper, the authors suggested that the dual labor market model may be relevant for Israel:[7] while human capital variables were shown to enhance male earnings within the designated primary labor market, they failed to do so in the secondary sector. In a similar vein, and following Benham, wife's education would be expected to exert a positive influence on husband's earnings in primary labor markets. However, for secondary labor markets, where own human capital attributes generally do not result in enhanced earnings, it might be surmised that husband's earnings would not show any relationship to wife's educational level. To test this proposition, we returned to the original data set used in the previous paper; the male sample was, as before, decomposed into primary and secondary labor market sectors. Employing a method used by McNabb and Psacharopoulos[8], the allocation to market sector was based on occupational prestige scores, workers in low prestege occupations (comprising some 29 per cent of the sample) being assigned to the secondary labor market sector.[9]

Earnings functions of the Mincer type were estimated for both primary and secondary labor markets using a specification that included variables relating to spouse's education and to the number of years married. Our results (reported below) while supporting the notion of a positive cross-productivity effect of wife's education on husband's earnings in the primary sector, found no such effect for the secondary sector. Some readers may be sceptical about the validity of the dual labor market model, which remains the subject of some controversy in the literature. Even so, it is hoped that our findings, showing that wife's human capital augments husband's earnings in some occupational categories (of higher prestege) but not in others (with low

status), will be of interest also to those who do not share the authors' dual labor market interpretation of the results.

Data:

The data used in this study are drawn from the 1974 Israel Labor Mobility Survey, conducted by the Central Bureau of Statistics and relate to married full-time working males. We estimated a series of earnings functions for the primary and secondary labor market sectors respectively, in which the log of individual annual earnings for full-time male married workers (with wife present) is run against three sets of explanatory variables, the first two of which were included in the regression model specified in the earlier paper:

(a) traditional human capital related variables: years of schooling (SCH), years of labor market experience (EXP, defined as age-SCH-6), EXP^2, an interaction variable EXP.SCH and number of years employed at present place of work (PRESWK).

(b) control variables: years of residence in Israel (RESID), weeks worked in the past year (WEEKS), hours worked per week (HOURS), a dummy variable relating to ethnic origin (ETHNIC, Oriental = 1, Western = 0) and a series of dummy variables for economic sector.[10/]

(c) characteristics of marriage variables: variables were added, in alternative regression specifications, relating to duration of marriage, wife's schooling and various interaction terms that included these variables. The variables used in the regression runs reported in the tables are: years of marriage (MARR), a dummy variable relating to wife's level of schooling (WSCH=1 if wife had at least completed final grade at high school and =0 if otherwise), and interaction terms WSCH.MARR and SCH.MARR.

The hypothesis to be tested is that cross-productivity effects of wide's education will be evident in primary labor market but absent in secondary markets. Just as own human capital investments remain generally unrewarded in secondary labor markets, so spouse's human capital stock will not contribute to own earnings, via the cross-productivity processes of association, as outlined above.

Main Findings:

Our central results are presented in Table 1, which confirm that the traditional human capital variables for the worker are positive and significant (except for EXP.SCH) in primary labor markets, while the coefficients relating to own human capital are all non-significant for the secondary sector, as predicted by the dual labor market model. However our focus is on the group C variables.

In regression model (1) the two variables relating to wife's level of schooling and duration of marriage respectively are of interest for testing the cross productivity model. While MARR is insignificant in both the primary and secondary sectors, WSCH is positive and highly significant in the primary sector, though not significant in the secondary. A well educated wife, who has at least completed high school, raises her husbands productivity (and earnings) by about 9 percent if he works in the primary sector, but does not enhance earnings if he is confined to the secondary sector.[11/] These results are highly confirmatory of Benham's for the U.S. labor market as a whole.

However, Benham's findings have been treated by some commentators with caution, arguing that they are equivocal, being consistent also with an explanation in terms of mate sorting.[12/] In the latter viewpoint, more able persons (thus having higher earnings) seek out and tend to marry women with desirable traits, such as high education - thus any measured correlation between wife's education and husband's earnings may be statistical only rather than causative, the line of causation running through husband's ability rather than directly between wife's education and husband's earnings. This criticism might be relevant in the present case too.

It could be argued that a good education is regarded as a desirable trait in a wife in primary labor markets where workers are more educated on average (10.4 mean years schooling) but not in secondary markets where worker educational attainments are typically lower (7.2 years of schooling, on average).[13/] A less well educated worker, even though he is able, might feel

threatened by a wife better educated than himself. Thus, the process of mate sorting described above might take place in primary labor markets but not secondary ones. The statistical correlation between wife's education and own ability which might explain the statistical significance of wife's schooling on earnings, would be at work in primary labor markets only. This, in turn, could account for the differences in the results between primary and secondary sectors for regression model (2) as well as those reported in footnote 11.

We attempt to deal with the issue of sorting by adding two interaction variables, WSCH.MARR and SCH.MARR, to the earnings function. These results (regression model (2)) constitute the central findings of this paper. While both wife's schooling and duration of marriage do not, alone, have a significant effect on husband's earnings in either sector, the interaction term WSCH.MARR is positive and highly significant for primary sector workers, but not for secondary sector workers.[14/] This suggests that the schooling of a well educated wife exerts a positive influence on husband's earnings, which increases with years of marriage.[15/] While this is a plausible result for the cross-productivity model, it is not predicted by the mate sorting approach. Finally, given the high correlation between spouses' education, an interaction term of MARR with own schooling was included (SCH.MARR), to avoid biassing the WSCH.MARR coefficient.

In sum, the lack of significance on the WSCH variable alone, and more particularly the positive coefficient on the interaction of WSCH and duration of marriage in the primary sector tells against an explanation in terms of mate sorting. These results may be seen as a confirmation of the

presence of a positive cross-productivity effect of wife's education on husband's earnings when the latter is attached to the primary labor market sector. In contrast, regression model (2) results relating to secondary labor markets are highly compatible with the type of outcomes that would be expected in secondary labor markets. The own human capital variables are all non significant, as is the WSCH.MARR interaction term, indicating that, unlike in the primary labor sector case, wife's human capital does not contribute to husband's labor market effectiveness.[16/]

Selectivity bias and other statistical issues:

Our central findings were presented in the preceding section. In the present section we offer further tests of the robustness of our main, regression model (2) results.[17/] First we take account of the possibility that the estimates for regression model (2) may be affected by selectivity bias (even though in the dual labor model there are constraints on the freedom of the worker to choose which market sector to join). It is possible that the random component of the earnings function is correlated with the sectoral choice equation. If this were the case, any direct estimation of the earnings functions, without including the conditional mean of the error as an explanatory variable, would result in biased estimates. We attempted to correct our sector-specific earnings equations for selection bias using the two-stage estimation procedure suggested by Heckman.[18/]

We first estimated a logit function determining the choice between primary and secondary sectors based on own schooling, wife's schooling, age

and years of residence in Israel. Then, the estimated parameters of the logit function were used to construct a correction factor, lambda (the inverse of Mill's ratio), which was entered as a regressor in the earnings functions which were now reestimated.

The coefficients of the correction factors (lambda) in both the primary and the secondary sectors were insignificant (t=1.22 for the primary and t=0.01 for the secondary sector) which means that there is no self selection to labor market sector. The use of separate sector-specific functions is justified.[19/]

Finally, we consider the possibility that the variable measuring number of weeks worked (WEEKS) may not be exogenous: workers with high wage rates may tend to work more weeks in the year. Since the dependent variable is annual earnings it seemed appropriate to add WEEKS as an explanatory variable; however, including WEEKS in the regression models, without taking account of its possible endogeneity, may create some perverse effects on other variables. One way of dealing with this statistical problem is to adopt a two stage least squares approach, treating both annual earnings and WEEKS as endogenous variables. The results, based on regression model (2) are presented in Table 2, as regressions (3).

Compared with regression model (2) results, the differences are minor. The main change is in the WEEKS variable: previously positive and highly significant in both sectors, it now loses its significance in the secondary sector (indicating that it is endogenous in that sector) and is

larger, though of lower significance, in the primary sector. However, no major change is effected in the coefficients on the WSCH.MARR variable, which remains significant in the primary sector only, the rate of return rising from 0.88 percent for each year of marriage to 1.13 percent.[20/]

Discussion:

It is now well accepted in the human capital literature that the benefits stemming from educational investment extend beyond those directly emanating from enhanced wages. Thus, even for educated married women not attached to the labor market, benefits from education will show themselves in terms of greater efficiency in housework and running the home and in the quality of child care and rearing. Measured private rates of return to female educational investment that failed to take account of these benefits within the household context, would understate true rates of return. Benham has argued that there are likely to be additional labor market benefits of female education through an augmentation of husband's earnings - a highly focussed instance of the economic benefits stemming from association.

In the present paper we have suggested that such cross-productivity effects may not be forthcoming in all labor market contexts; for some occupational groupings these effects may be strong, for others weak or absent. This was found to be the case in Israel for occupational groupings, relating to higher and low status occupations; cross productivity effects were positive for the former group but not significant for the latter. We interpret these

two groups as corresponding to workers attached to primary and secondary labor markets, respectively.

In such a situation where the labor market is characterized by duality, wife's human capital stock as well as that of the husband can be seen as augmenting the latter's earnings in the primary sector (a finding in line with Benham's results for the U.S.); however, for husbands attached to the secondary sector neither husband's nor wife's human capital have any significant effect in raising husband's earnings. These results attest to the presence of positive cross-productivity effects of wife's education on husbands earnings in the primary, but not in the secondary, labor market sector, a finding that is consistent with the general implications of the dual labor market model.

The question now arises whether, for families where the husband is attached to the secondary sector, the household benefits of wife's education, too, are zero (or at least significantly lower than in the primary sector), as is the case for labor market benefits (resulting either from husband's higher productivity or form the cross-productivity effects of wife's education).

Such a possibility may go some way towards offering a partial explanation for one of the dominant characteristics of the dual labor market model - the extremely low inter-sector mobility between primary and secondary sectors, and the consequent durability of the latter sector. Why is attachment to the secondary labor market sector so strong, given the clear benefits available from moving to the primary sector? Evidently, this

obduracy is the result of negative, intergenerational, behavioral traits and ingrained attitudes towards the world of work (reinforced by the type of employment offered by, and low expectations of, secondary sector employers). Traditionally, economists have looked to educational investments as a means of dealing with the problem of the low paid and the cycle of poverty, not only through raising potential productivity and wages, but also, over the longer term, by changing individual attitudes, expectations and motivations. Dual labor market theorists on the other hand claim that educational investments will be ineffective in leading to higher wages for those attached to secondary labor markets; it is also possible that these longer term, attitudinal effects of education, too, will be circumvented, if women who have received additional education are unable as wives and mothers to transmit improved attitudes or values to other members of the household, particularly the younger ones. In such situations, these low household benefits of wife's education would constitute a factor, on the supply side, accounting for the durability of secondary labor markets.

NOTES

1. See, for example, Theodore Shultz (editor), Economics of the Family (Chicago: Chicago University Press, 1974).

2. Lee Benham, "Benefits of Women's Education within Marriage", Journal of Political Economy, (March-April 1974).

3. See G.S. Becker, "A Theory of Marriage", Journal of Political Economy (July-August 1973).

4. The theory of the benefits of association can be extended to include other dimensions of the effects of wife's attributes and marriage on husband's earnings: see A. Grossbard-Shechtman and S. Neuman, "Men's Earnings, Marriage, and Culture" Mimeo 1988. This paper confirms the applicability of Benham's approach to Israel.

5. Benham, p 376.

6. See Yue-chim Wong, "Entrepreneurship, Marriage and Earnings," Review of Economics and Statistics, 1986. These particular findings, however, may be suspect, because of data inadequacies: see A. Ziderman, "Testing for cross productivity effects of education among entrepreneur families," Mimeo 1989.

7. S. Neuman and A. Ziderman, "Testing the Dual Market Hypothesis: Evidence from the Israel Labor Mobility Survey," Journal of Human Resources (21, 1986). The classic presentation of the dual labor market viewpoint is given in Peter Doeringer and Michael Poire, Internal Labor Markets and Manpower Analysis, (Lexington, Mass: D. C. Heath, 1971).

8. Robert McNabb and George Psacharopoulos, "Further Evidence of the Relevence of the Dual Labor Market Hypothesis for the UK", Journal of Human Resources (16, 1981).

9. Tyree's occupational prestege ratings for Israel were used; see Andrea Tyree, "Occupational Socioeconometric Status, Ethnicity,and Sex in Israel: Considerations in Scale Construction" (Hebrew) Megamot. (September 1981). Workers were assigned to primary or secondary labor markets on the basis of occupational prestige scores, rather than earnings as is the case in many other studies, in order to avoid problems of truncation bias, as discussed in G. Cain, "The Challenge of Segmented Labor Market Theories to Orthodox Theory: A Survey," Journal of Economic Literature, (14, 1976). The correlation between earnings and prestige scores is not high. See Neuman and Ziderman for an account of, and justification for, the method used.

10. The economic sectors are: Industry (mining and manufacturing) - IND; Electricity and water - ELECT; Construction (building and public works) - CONSTR: Commerce, restaurants and hotels - COMM; Transport, storage and communications - TRANS; Financing and

business services - FINANCE; Personal and other services - PRIVATE. Agriculture, forestry and fishing is included in the constant term. Public services sector was not included in this analysis: see Neuman and Ziderman p.232.

11. Two other specifications of wife's education which were tried yielded similar results: the variables representing wife's education were significant only in the primary sector, in both cases. First, wife's education was entered as a continuous variable, measured by years of schooling; the coefficient was 0.0220 (t=3.38), indicating that each additional year of wife's schooling enhances husbands earnings (in the primary sector) by over 2 per cent annually. Alternatively, two dummy variables for wife with 9-11 years and at least 12 years of schooling, respectively, were used (with 0-8 years of schooling as the reference group). The coefficients were, in turn, 0.0873 (t=1 19) and 0.1540 (t=2.90).

12. See Becker and also Finis Welch, "Comment," Journal of Political Economy (March-April 1974).

13. The standard deviations are similar: 3.7 and 3.8. The wives of primary sector workers, too, are more educated - a mean of 9.8 years (standard deviation 3.7), compared with 6.2 (3.9) for wives of secondary sector workers. The correlation coefficient between spouses' education attainment is higher in the primary sector (0.673) than the secondary (0.516).

14. To confirm that there is a significant difference between the WSCH.MARR term for the two segments, an earnings equation similar to regression model (2) was run jointly for the entire sample. A dummy variable PRIM was added (=1 if worker is attached to the primary sector), as well as interaction terms of PRIM with each of the worker's (own) human capital variables as well as with the characteristics of marriage variables. The coefficient on the variable PRIM.WSCH.MARR is positive (b=0.0058) and significant, at the 10 per cent level. Following the suggestion of an anonymous referee, the composite regression was rerun without the full range of interactions between PRIM and husband's own characteristics leaving interactions with the characteristics of marriage variables only. The effect is to increase both the size of the PRIM.WSCH.MARR coefficient and its level of significance (b=0.0073, t=1.99).

15. Regression model (2) was estimated with the alternative specifications of wife's schooling, given in note 10. Insignificant coefficients on the interaction term of wife's schooling and marriage duration were found for both the continuous WSCH variable case and for the middle level schooling interaction dummy (9-11 years schooling and MARR), suggesting that it is only when wives are fairly well educated that they are able to exert a positive cross productivity effect in raising husbands' income.

16. Supportive findings were produced from largely duplicated regression runs using data drawn from the 1983 Israel Census of Population, a source that was as yet unavailable at the time the original research reported in Neuman and Ziderman was undertaken. Thus, on the basis of a much more comprehensive data set (with 7703 and 2491 observations in the primary and secondary sectors, respectively), but lacking the important PRESWK variable, these regressions offered further support for the existence of dual labor markets in Israel. The human capital variables performed as predicted in each of the sectors, including those testing the cross-productivity effects of wife's education. These regression results based on the Census of Population are available from the authors, on request.

17. This section owes much to the helpful suggestions of an anonymous referee.

18. James J. Heckman, "The Common Structure of Models of Truncation, Sample Selection and Limited Dependent Variables and a Simple Estimator for Such Models", Annals of Economic and Social Measurement, (5, 1976), and James J. Heckman, "Sample Selection Bias as a Specification Error", Econometrica (47, 1979). For an application of this approach to dual labor markets, see James J. Heckman and Joseph V. Hotz, "The Sources of Inequality in Panama's Labor Market", Journal of Human Resources, (21, 1986).

19. These results are obtainable from the authors, on request.

20. We also tried adding the selectivity correction factor lambda to this 2SLS regression. Again, lambda was insignificant in both sectors.

Table 1

Earnings Functions (OLS): Primary and Secondary Labor Markets
(Dependent Variable: Log Annual Male Earnings)

Independent Variables	Regression Model (1)				Regression Model (2)			
	Primary Sector		Secondary Sector		Primary Sector		Secondary Sector	
	b	t	b	t	b	t	b	t
(a) Human capital variables								
SCH	0.0420	3.03	-0.0223	-0.90	0.0513	3.54	-0.0177	-0.69
EXP	0.0183	1.78	-0.0013	-0.08	0.0134	1.19	0.0018	0.11
EXP^2	-0.0003	-2.66	-0.0002	-0.97	-0.0003	-2.53	-0.0002	-0.95
EXP.SCH	-0.0004	-1.08	0.0007	1.08	-0.0001	-0.16	0.0003	0.35
PRESWK	0.0119	5.03	0.0025	0.71	0.0123	5.20	0.0026	0.76
(b) Control variables								
RESID	0.0030	1.83	0.0080	3.16	0.0030	1.82	0.0081	3.17
WEEKS	0.0323	12.26	0.0361	10.04	0.0327	12.45	0.0363	10.02
HOURS	0.0093	3.54	0.0031	0.67	0.0092	3.51	0.0028	0.60
ETHNIC	-0.0920	-2.41	-0.1178	-2.25	-0.0984	-2.58	-0.1168	-2.22
Economic Sector:								
IND	0.1745	1.17	0.2865	3.07	0.2202	1.46	0.2809	3.00
ELEC	0.1773	1.00	*	*	0.2174	0.43	*	*
CONSTR	0.1339	0.86	0.2850	2.64	0.1884	1.20	0.2783	2.57
COMM	0.0455	0.29	0.1796	1.61	0.0938	0.59	0.1836	1.63
TRANS	0.0902	0.58	0.2483	2.02	0.1439	0.93	0.2351	1.89
FINANCE	0.1824	1.17	*	*	0.2364	1.50	*	*
PRIVATE	0.0276	0.17	0.2524	1.70	0.0696	0.43	0.2426	1.62
(c) Characteristics of marriage variables								
WSCH	0.0857	2.03	0.0267	0.27	-0.0528	-0.69	-0.0507	-0.30
MARR	0.0007	0.22	-0.0001	-0.29	0.0089	1.10	-0.0055	-0.79
WSCH.MARR	-	-	-	-	0.0088	2.15	0.0044	0.59
SCH.MARR	-	-	-	-	-0.0011	-1.38	0.0005	0.63
CONSTANT	6.8690	23.39	7.3888	17.78	6.7785	22.95	7.3659	17.54
R^2	0.4568		0.4764		0.4629		0.4795	
n	488		198		488		198	

Notes:

b: Coefficient t: t-statistic

The following variables are included in the constant term:
Ethnic origin: western
Economic sector: agriculture
Wife's education: less than 12 years of schooling

* No observations in these categories.

Table 2

Earnings Functions (2SLS): Primary and Secondary Labor Markets (Dependent Variable: Log Annual Male Earnings)

Independent Variables	Regression (3)			
	Primary Sector		Secondary Sector	
	b	t	b	t
(a) Human capital variables				
SCH	0.0465	2.83	-0.0088	-0.30
EXP	0.0036	0.22	0.0120	0.59
EXP^2	-0.0002	-1.24	-0.0003	-1.24
EXP.SCH	0.0002	0.31	-0.00007	-0.08
PRESWK	0.0108	3.49	0.0049	1.13
(b) Control variables				
RESID	0.0036	1.90	0.0076	2.68
WEEKS	0.0547	2.18	0.0148	0.72
HOURS	0.0083	2.78	0.0032	0.63
ETHNIC	-0.0885	-2.09	-0.1245	-2.15
Economic Sector:				
IND	0.2425	1.48	0.2611	2.50
ELEC	0.2774	1.37	*	*
CONSTR	0.2567	1.38	0.2170	1.65
COMM	0.1077	0.63	0.1625	1.30
TRANS	0.1827	1.06	0.1292	0.77
FINANCE	0.2430	1.44	*	*
PRIVATE	0.0624	0.36	0.1144	0.57
(c) Characteristic of marriage variables				
WSCH	-0.1078	-1.04	0.0145	0.07
MARR	0.0103	1.17	-0.0071	-0.91
WSCH.MARR	0.0113	2.17	0.0003	0.04
SCH.MARR	-0.0014	-1.54	0.0006	0.74
CONSTANT	5.8545	5.34	8.2728	8.64
R^2	0.3199		0.2330	
n	488		198	

Notes:

b: Coefficient t: t-statistic

The following variables are included in the constant term:
Ethnic origin: western
Economic sector: agriculture
Wife's education: less than 12 years of schooling

* No observations in these categories.

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